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THE PREPARATION OF EIGHT ALUMINUM INDUSTRY PROCESS SAMPLES FOR USE AS REFERENCE MATERIALS FOR ALCAN INTERNATIONAL LIMITED, ARVIDA, QUEBEC

by

C.W. Smith and M. Raicevic

January 1988

Project: 30.69.99
Cost Recovery

Job No.: 025285

MINERAL SCIENCES LABORATORIES
DIVISION REPORT MSL 88-4 (CR)

35 pp

CONFIDENTIAL

92-06663/

PRÉPARATION DE HUIT ÉCHANTILLONS DE TRAITEMENT INDUSTRIEL DE L'ALUMINIUM DESTINÉS À SERVIR DE MATÉRIAUX DE RÉFÉRENCE CHEZ ALCAN INTERNATIONAL LIMITÉE, ARVIDA (QUÉBEC)

par

C.W. Smith* et M. Raicevic**

RÉSUMÉ

En vertu d'une entente à prix coûtant avec Alcan International Limitée d'Arvida (Québec), deux échantillons de bauxite, un échantillon de coke calciné et cinq échantillons de boue rouge ont été préparés pour fins de caractérisation et d'utilisation comme matériaux de référence destinés à des analyses de composition chimique.

Les échantillons de boue rouge, reçus sous forme de boues caustiques, ont été filtrés, lixiviés et lavés dans le but d'en réduire les résidus alcalins. Tous les échantillons ont ensuite été séchés, fragmentés en tranches granulométriques prescrites, mélangés et mis dans des bouteilles étiquetées.

Le projet a pris fin avec la livraison des échantillons préparés à Alcan, le 13 janvier 1988.

Mots clés : bauxite, boue rouge, coke, matériaux de référence, composition chimique

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*Section des matériaux de référence, Laboratoire de chimie

**Section de préparation des minéraux, Laboratoire de traitement des minéraux

THE PREPARATION OF EIGHT ALUMINUM INDUSTRY PROCESS SAMPLES FOR USE AS REFERENCE MATERIALS FOR ALCAN INTERNATIONAL LIMITED, ARVIDA, QUEBEC

by

C.W. Smith* and M. Raicevic**

ABSTRACT

Under a cost recovery arrangement with Alcan International Limited of Arvida, Quebec, two bauxite samples, one calcined coke and five red mud samples were prepared for characterization and use as reference materials for chemical composition.

The red mud samples, received as caustic slurries, were filtered, leached and washed to reduce the contained alkaline residue. All samples were subsequently dried, comminuted to particle size specifications, blended and bottled in labelled bottles.

The project was completed with the delivery of the prepared samples to Alcan by January 13, 1988.

Keywords: bauxite, red mud, coke, reference materials, chemical composition

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*Reference Materials Section, Chemical Laboratory
**Mineral Dressing Section, Mineral Processing Laboratory

INTRODUCTION

In January 1987 the Mineral Sciences Laboratories of CANMET entered into an agreement with Alcan International Limited of Arvida, Quebec to prepare seven aluminum industry process materials as candidate samples for use as reference materials for chemical composition. The samples were two bauxites (identifiers BXT-07 and BXT-08), four Bayer process red muds (identifiers RM-01 to RM-04) and one calcined coke (identifier PCC-01). A fifth mud sample was subsequently added (RM-05). The original request and Letter of Agreement are appended as Annex I of this report. Subsequent communications from Alcan which contain material descriptions and additional preparative instructions are appended in Annex II.

In summary, the requirement was for drying, crushing and sieving to particle size specifications followed by blending and bottling in specified unit sizes. Before these operations, the red mud samples, delivered as caustic slurries, were to be filtered, leached with ammonium hydroxide and washed to remove as much as possible of the caustic residues.

The leaching and washing operations were undertaken by the Mineral Dressing Section, Mineral Processing Laboratory. The remaining work was undertaken by the Reference Materials Section, Chemical Laboratory. Comminution, blending, bottling and labelling labour was carried out by a temporary employee contracted by Alcan through an Ottawa agency under the direction of and with the assistance of CANMET staff. The daily log of this employee is attached as Annex III.

By agreement with Alcan, the work was carried out in stages throughout 1987 to accommodate other requirements of CANMET facilities and personnel. The preparative work was completed on January 8, 1988 and the samples were crated for delivery to Alcan in Arvida the following week.

TECHNICAL SUMMARY

Bauxite Samples

For each sample the following procedures were carried out sequentially, in accord with the Alcan instructions:

1. drying at 105°C to 120°C for 16 hours (note 1).

2. grinding by passage through a jaw crusher and then by passage twice through a Denver roller mill.

3. ball-milling in two portions.

4. sieving through a 150 mesh (104 µm pore-size) stainless steel screen (note 2).

5. ball-milling of +150 mesh residue followed by sieving through 150 mesh screen to recover the -150 mesh product.

6. combining of the -150 mesh fractions and re-drying for 16 h at 105°C to 120°C.

7. blending of the -150 mesh product for 16 h (note 3).

8. testing for 100% -150 mesh product by the wet-screen method (note 4).

9. bottling of the blended product in labelled bottles in nominal 100-gram units (note 5).

The product yields are summarized in Table 1.

Table 1 - Product yields (kg) from bauxite preparations

	Received	Dried	Post Grind.	Post-Sieving +104 µm	Post-Sieving -104 µm	Number Bottles
BXT-07	54.4	50.8	47.6	0.9	44.9	417
BXT-08	72.1	71.7	69.8	5.4	60.6	574

Calcined Coke Sample

The sample of 163 kg was screened through stacked 4 mesh (4.70 mm) and 14 mesh (1.17 mm) screens (note 2; no brushing). This yielded 48.6 kg of -4 to +14 mesh material. The +4 mesh residue was then rescreened to yield an additional 2.75 kg of -4 to +14 mesh material. The residual +4 mesh material was discarded. The combined product was rescreened on the 14 mesh screen yielding finally 47.2 kg of product. This was blended for one hour only to minimize autogenous grinding (note 3). The blended product was bottled in 800-gram units (rather than 1 kg units as originally requested) in accord with telephone instructions from Alcan. Fifty-eight bottles were obtained (note 5).

Red Mud Samples

A. Removal of Alkaline Residue

For each sample the following sequential procedure was carried out. This procedure was somewhat different than was originally outlined by Alcan.

1. The pulp was transfered to a stainless steel conditioner mounted on a moyno pump and agitated until a homogeneous mixture was produced.

2. The pulp was transfered to a 1000 L stainless steel tank.

3. The tank was filled with a 1% solution of ammonium hydroxide, and the slurry was agitated thoroughly with a wooden paddle and then allowed to settle for 24 hours. The clear supernatant solution was then decanted.

4. Step (3) was repeated two more times.

5. Step (3) was repeated with hot tap water replacing the ammonium hydroxide solution.

6. The pulp was transfered to a 0.84-m^2 pan filter and washed and filtered with a total of 200 L of distilled water.

7. The pulp was finally washed with 20 L of ethanol, filtered and transfered to plastic bags.

B. Processing of Leached Products

Each red mud sample was carried through the following preparative steps in sequence:

1. The leached and washed product was dried at 105°C to 120°C for 15 hours overnight (note 1).

2. The product was hand-rolled with a rolling pin to break up larger agglomerates and then milled for approximately 10 minutes in a vibration-energy grinding mill (Sweco, Model DM-3L) employing one inch ceramic grinding cylinders.

3. The product was screened through 150 mesh (104 µm) screen (note 2). The oversize portion was again milled and screened and the -150 mesh product was combined and again dried in accord with Alcan instructions.

4. The dried product was blended for 16 hours (note 3) and then bottled in nominal 100 gram units (note 5).

Table 2 - Product yields (kg) for red mud sample preparation

	Leached solids		+150 µm	-150 µm	No. 100-gram
	Wet	Dried	(Reject)	(Product)	Bottles
RM-01	55.1	27.9	1.4	25.6	230
RM-02	83.2	58.1	2.7	51.7	480
RM-03	35.8	17.2	*	*	*
RM-04	32.2	21.5	0.2	21.1	199
RM-05	27.2	17.5	0.2	17.2	165

* Last sample prepared; information inadvertently not recorded.

Notes on Technical Preparation

1. Materials were dried on stainless steel trays on a steam-fed pipe bed.

2. Sieving was carried out through a 61 cm diameter stainless steel screen on a mechanically-vibrated siever (Russell Finex Model 804). Rotating brushes continuously agitated the material being screened.

3. A 540 L conical steel rotating blender operated at 26 rpm was used (Mohr Systems SO # 9268).

4. Fifty or one hundred gram grab samples were placed on a standard Tyler 150 mesh screen which was agitated manually in a stream of running water with periodic manual dispersion of the sample. The product was judged to meet specifications if there was not more than a few grains of visible residue.

5. Each bottle was labelled inconspicuously on the bottom with the bottling sequence number to assist the client in sampling for homogeneity testing.

SUMMARY OF DISTRIBUTION OF LABOUR

Table 3 - Summary of labour hours. CANMET staff unless otherwise indicated

Person	Classification	Labour Hrs.
P. Westra	GL-PRW 8	40
J.P. Rouleau	GL-MOC 8	40
D.G. McIntosh	GL-MOC 7	55
J. Pollard*		368

* Temporary employee contracted by Alcan International

SUMMARY OF SUPPLY COSTS

Table 4 - Supplies acquired by CANMET for these preparations

No. Items	Item Description	Cost, $
1	Stainless steel screen, 150 mesh	100.44
1	Stainless steel screen, 14 mesh	N.C.
1	Stainless steel screen, 4 mesh	N.C.
5	Dust/fume mist respirators	38.63
100 L	Ethanol	450.00
150 L	Ammonium hydroxide	436.70
		TOTAL $1025.77

Note: - All bottles and labels were supplied by Alcan.
- N.C.= no charge; borrowed equipment

CONCLUSION

The prepared bauxite materials and the coke material were shipped to Alcan in Arvida in August, 1987. The red mud materials were shipped COD to Alcan as per their instructions by January 13, 1988.

ACKNOWLEDGEMENT

J.P. Rouleau of the Mineral Processing Laboratories carried out the work concerning leaching and washing of the red mud samples. P. Westra of the Mineral Sciences Laboratories supervised the preparative labour and arranged for the acquisition of supplies, transportation of the materials and hiring, training and supervision of the Alcan temporary employee. D.G. McIntosh assisted with key operations of the preparations. J. Pollard, the temporary employee hired on behalf of Alcan, carried out the majority of the labour of preparation and did so in a competent efficient manner.

APPENDIX I

LETTER OF REQUEST

LETTER OF AGREEMENT

Alcan International Limited
Arvida Research and Development Centre

1955 Mellon Blvd, P.O. Box 1250, Jonquière (Québec) Canada G7S 4K8
418/548-1121 Telex: 05-25236

23 October 1986

Dr. Clinton W. Smith
Acting Coordinator
Canada Centre for Mineral and Energy Technology
555 Both Street
Ottawa, Ontario K1A 0G1

Re: Production of Reference Materials

Dr. Smith,

As mentioned in Dr. Kimmerle's letter to you dated 15 October 1986, we would like to receive a quotation regarding the preparation of two bauxites, four red muds and one calcined coke. The requirements for the project are outlined in Appendix I.

We also understand that the work will be scheduled to suit CANMET's priorities and Alcan will agree to pay the following costs: staff supervision, temporary employee, bottles, labels and shipping at Alcans expense.

Sincerely yours,

G.F. Giasson
Coordinator of
Inorganic Analysis

GFG:epm

Copies: Dr. M. Authier-Martin
Mr. C. Brisson
Dr. F.M. Kimmerle
Dr. H.F. Steger, CANMET, Ottawa

APPENDIX I

REQUIREMENTS FOR SAMPLE PREPARATION

A. BAUXITE:

1. Samples: two samples of bauxite of about 70 kg each, having particle size up to 1 inch.
2. Drying: Unground sample, overnight at 105°C.
3. Grinding: Grind each sample at -150 mesh.
4. Screening: Screen each sample to -150 M and regrind oversize to 98% -150 M.
5. Drying: Ground sample, at 105°C for a minimum of 16 hours.
6. Blending: Blend each sample for 16 hours.
7. Bottling: Portion of 100 g in 125 mL plastic bottles.
8. Labeling: Affix a label on each bottle.
9. Shipping: Pack in labels boxes (90 bottles/box).

B. RED MUD:

1. Samples: Four red mud slurries of 50-70 kg each, containing 70-80% solids in caustic solution (2-3 gpl NaOH): two 5-gallons for each sample.
2. Filtering: Filter red mud slurry through a Whatman #40 filtering paper (15 cm) or piece of cloth of equivalent pore size for larger quantity to obtain a cake of 1 inch thick maximum. Filtration under vacuum is required but the cake must always be kept wet to avoid cracking. This is mainly important during cake washings.
3. Washing: Wash the cake three or four times with 10% v/v NH_4OH and wash it several times with hot distilled water until the washing water is neutral with phenolphtalein indicator. Wash it one or two times with acetone or ethanol to remove water.
4. Drying: Remove the cake and dry overnight at 105°C.
5. Grinding: Grind each sample at -150 mesh.
6. Screening: Screen each sample to -150 M and regrind oversize to 98% -150 M.
7. Drying: Ground sample, at 105°C for a minimum of 16 hours.
8. Blending: Blend each sample for 16 hours.
9. Bottling: Portion of 100 g in 125 mL plastic bottle.
10. Labeling: Affix a label on each bottle.
11. Shipping: Pack in labeled boxes (90 bottles/box).

APPENDIX I

REQUIREMENTS FOR SAMPLE PREPARATION

C. CALCINED COKE:

1. Sample: One sample of calcined petroleum coke of 150 kg, containing particle size up to 2 inches.
2. Screening: Screen the sample to obtain the -4 mesh to +14 mesh fraction (Tyler screens). This represents 40-50% portion of original material. Discard the remaining fractions (+4 mesh and -14 mesh)
3. Blending: Mix the sample 1-2 hours only to avoid formation of fines.
4. Bottling: Split the sample in 1 kg portions (2 L plastic bottles).
5. Labeling: Affix a label on each bottle.
6. Shipping: Pack in labeled boxes.

Energy, Mines and Resources Canada
Research and Technology
Canada Centre for Mineral and Energy Technology.
555 Booth Street.
Ottawa, Canada
K1A 0G1

Énergie, Mines et Ressources Canada
Recherche et Technologie
Centre canadien de la technologie des minéraux et de l'énergie.
555, rue Booth.
Ottawa, Canada
K1A 0G1

Your file Votre référence

Our file Notre référence

January 6, 1987

Dr. G.F. Giasson
Coordinator of Inorganic Analysis
Arvida Research & Development Centre
Alcan International Ltd.
1955 Mellon Blvd.
P.O. Box 1250
Jonquiere, Quebec
G7S 4K8

RE: Request for Production of Reference Materials

Dr. Giasson,

The attached annex responds to the request for the preparation of two bauxite, four red mud and one calcined coke reference materials as described in your letter of 23 October 1986.

If the work description and associated costs estimated are satisfactory please sign and return a copy of this Letter of Agreement to my office to initiate this project.

Sincerely,

L.L. Sirois
Director, Mineral Sciences Laboratories

I agree that the work description and costs as described in the Annex to this Letter of Agreement respond satisfactorily to the work requested in the letter of 23 October 1986.

Signed G.F. Giasson

Date 26/1/87

Canada

Annex To Letter of Agreement Between
Alcan International Ltd., Arvida Laboratories
And CANMET

1. Work will be carried out to prepare two bauxite, four red mud and one coke reference materials as per Appendix I of the letter of request from Dr. G.F. Giasson of Alcan dated 23 October 1986.
2. Alcan will provide the raw materials, appropriate bottles and labels and shipping containers.
3. Alcan will arrange to pay the costs for a temporary employee directly to the employment agency.
4. CANMET will undertake to select, train, supervise and assist the temporary employee(s) in the performance of the work, on behalf of Alcan. Skilled operations such as the red mud filtration will be performed by CANMET staff.
5. Alcan will pay shipping charges directly to the carrier.
6. CANMET will retain the right to adjust scheduling of the work to optimize useage of its facilities. Delivery of the products shall be accomplished within calendar year 1987.
7. The costs for CANMET labour and materials for this work is estimated as $7242. The additional cost to Alcan for temporary labour services is estimated as $2045. Cost will be adjusted per actual labour hours.

Attachments:
1. Summary of estimated costs.
2. Labour hours estimate - bauxite samples.
3. Labour hours estimate - red mud samples.
4. Labour hours estimate - coke sample.
5. Materials cost estimate.

Summary of Estimated Costs

Alcan International Ltd. Request of 23 October 1986.

Project	Labour Hours				Est.Cost of Labour		Est.Cost of Materials
	Temporary	PRW-8	MOC-7	MOC-8	CANMET	Temporary(1)	
Bauxites (2)	100	20	24	--	$1506	$720	$100
Red muds (4)	172	20	28	88(4)	$4636	$1239	$700
Coke (1)	12	0.5	2.5	--	$100	$87	$200
Total	284	40.5	54.5	88	$6242	$2045	$1000

Notes: (1) Estimated at $7.20 per hour. To be paid by Alcan directly to the employment agency.
(2) All bottles, labelling and packing materials to be provided by Alcan.
(3) Shipping charges to be paid by Alcan to carrier.
(4) Labour hours are dependent on filtration properties, and are difficult to estimate a priori. Costs to be adjusted for actual labour hours.

Labour Hours Estimate, Alcan International Ltd. Request of 23 October 1986

A. Bauxite Samples

Procedure	Labour Hours, Per Sample		
	Temporary	GL-MOC-7	GL-PRW-8
Drying, 105°C	2		
Crushing and Rolling	4	2	
Ball Mill (2x35 Kg)	8	2	
Screen (-150 mesh)	8	1	
Oversize ball milling	4	2	
Screen (-150 mesh)	4	1	
Drying, 105°C	2		
Blending	1	1	
Bottling (~200 bottles)	8	2	
Bottle labelling	8		
Packing for shipping	1	1	
General Supervision, logistics			10
Total hrs, per bauxite sample	50	12	10
Total, per two samples	100	24	20

Labour Hours Estimate, Alcan International Ltd. Request of 23 October 1986

B. Red Mud Samples

Procedure	Labour Hours, Per Sample			
	Temporary	GL-MOC-7	GL-MOC 8	GL-PRW-8
Filtration*			8*	
Wash to neutral, filter*			13*	
Dry 105°C*			1	
Ball mill (2x25 Kg)	6	1		
Screen (150 mesh)	8	1		
Oversize ball milling	3	0.5		
Screen (150 mesh)	3	0.5		
Dry 105°C	1			
Re screen (?)	6	0.5		
Blending	1	1		
Bottling (~500 bottles)	6	2		
Bottle Labelling	8			
Packing for shipping	1	0.5		
Supervision, logistics				5
Total hrs per red mud sample	43	7	22	5
Total hrs. per 4 samples	172	28	88	20

*Estimate by Mineral Processing Laboratory; difficult to quantify a priori.

Labour Hours Estimate, Alcan International Ltd. Request of 23 October 1986

C. Calcined Coke Sample

Procedure	Labour Hours Per Sample		
	Temporary	GL-MOC-7	GL-PRW-8
Screen, discard +4 mesh	3	0.5	
Screen, discard -14 mesh	3	0.5	
Blend (-4 to +14 mesh)*	1	0.5	
Bottling (~75 bottles)	3	0.5	
Bottle labelling	1		
Packing for shipping	1	0.5	
General Supervision, logistics			0.5
Total hours per sample	12	2.5	0.5

*Blend time will be minimized, but some autogenous grinding due to tumbling is to be expected. It is assumed that any fines so generated would be acceptable.

Materials Cost Estimate, Alcan International Ltd. Request of 23 October 1986

Item	Project	Cost
Screen, stainless steel, 150 mesh	bauxites, red muds	$100.44
Screen, stainless steel, 4 mesh	coke	$100.44
Screen, stainless steel, 14 mesh	coke	$100.44
Filtration, washing supplies	red muds	$700.00
Total		$1001.32

APPENDIX II

COMMUNICATIONS FROM ALCAN

Received 22 Jan '87

Alcan International Limited
Arvida Research and Development Centre

1955 Mellon Blvd, P.O. Box 1250, Jonquière (Québec) Canada G7S 4K8
418/548-1121 Telex: 05-25236

19 January 1987

Mr. Clinton W. Smith
Acting Coordinator
Canada Centre for Mineral
and Energy Technology
555 Booth Street
Ottawa, Ontario
K1A 0G1

Dear Mr. Smith:

Re: Production of Reference Materials: Red Muds

Under separate cover, you will receive ~ 50-60 lbs. of red mud slurry. The original sample, consisting of ~ 30-40 % solids in a caustic solution, has been decanted but not washed to increase the % solids content to ~ 60-70 %.

The usual steps followed for the preparation of analytical laboratory samples of red mud slurries must be carried out, in the same manner, for the preparation of this certified reference material to-be. A brief description of the preparation procedure has already been forwarded to you(1). Be assured that I will be pleased to answer any questions you might have concerning this preparation. As agreed with Dr. Giasson, I will be available at any time, to come to Canmet in the event that you would like to discuss any problems, or need any further information.

Best regards,

Monique Authier-Martin

MAM:PT

Copy to:

Dr. G.F. Giasson
Dr. F.M. Kimmerle

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(1) Letter G.F. Giasson, Alcanint, to C.W. Smith, Canmet, 23 October 1986.

Alcan International Limitée
Centre de recherche et de développement Arvida

1955, boul. Mellon, C.P. 1250, Jonquière (Québec) Canada G7S 4K8
Téléphone: 418/548-1121 Télex: 05-25236

27 January 1987

Dr. L.L. Sirois
Director
Mineral Sciences Laboratories
Canada Center for Mineral
and Energy Technology
555 Booth Street
Ottawa, Ontario
K1A 0G1

Re: Request for Production of Reference Materials

Dear Dr. Sirois:

As requested in your letter of 6 January 1987, please find attached a signed copy of your letter of agreement. I will soon contact Dr. C.W. Smith to initiate the work with Canmet. Again, thank you for your cooperation.

Sincerely yours,

G.F. Giasson
Coordinator of
Inorganic Analysis

GFG:PT

Copy to:

Dr. F.M. Kimmerle

Received 23 March 1987 CWJ

Alcan International Limited
Arvida Research and Development Centre

1955 Mellon Blvd, P.O. Box 1250, Jonquière (Québec) Canada G7S 4K8
418/548-1121 Telex: 05-25236

20 February 1987

Dr. Clinton W. Smith
Canada Centre for Mineral
and Energy Technology
555 Booth Street
OTTAWA, Ontario
K1A 0G1

Dear Dr. Smith:

Re: Preparation of Alcan Non-Metallic Standards

The following samples will soon be sent to your attention:

a) Two bauxites:
- TROMBETAS (BXT-07) in plastic bags (transparent)
- MURI MURI (BXT-08) in bags (jute/gunny bag)

b) Four red muds:
- 1 x 82 kg SARAMENHA Red Mud (RM-01) - One brown wooden box
- 198 lbs. AUGHINISH Red Mud (RM-02) - Two white plastic drums
- 2 x 75 lbs. KIRKVINE Red Mud (RM-03) - Two brown metallic drums
- 2 x 5 gallons U.H.2 Red Mud (RM-05) - Two white metallic drums

You already have received 2 x 5 gallons of U.H.1 Red Mud (RM-04).

As you might have already guessed, bauxite standards are labelled BXT-xx and Bayer Process Red Mud standards are identified as RM-xx. It is imperative that the identification listed above be followed so we can trace later on the origin of the prepared standards. The labels (BXT-07 and BXT-08, RM-01 to RM-05, "Mix thoroughly before use...extended storage") will also be sent to you in the near future.

Approximately 4500 wide-mouth plastic bottles (125 mL) have been ordered and will be delivered directly to CANMET (c/o Clinton W. Smith). The standards will thus be bottled in portions of approximately 100 g.

If you need any further information, please feel free to contact me at 418-699-3539. I will be glad to answer any of your questions.

Monique Authier-Martin
Research Scientist
Mineral Analysis Group

MAM:PT
Copies to:
Dr. G.F. Giasson
Dr. F.M. Kimmerle

APPENDIX I

REQUIREMENTS FOR SAMPLE PREPARATION

A. BAUXITE:

1. Samples: two samples of bauxite of about 70 kg each, having particle size up to 1 inch.
2. Drying: Unground sample, overnight at 105°C.
3. Grinding: Grind each sample at -150 mesh.
4. Screening: Screen each sample to -150 M and regrind oversize to 98% -150 M.
5. Drying: Ground sample, at 105°C for a minimum of 16 hours.
6. Blending: Blend each sample for 16 hours.
7. Bottling: Portion of 100 g in 125 mL plastic bottles.
8. Labeling: Affix a label on each bottle.
9. Shipping: Pack in labels boxes (90 bottles/box).

B. RED MUD:

1. Samples: Four red mud slurries of 50-70 kg each, containing 70-80% solids in caustic solution (2-3 gpl NaOH): two 5-gallons for each sample.
2. Filtering: Filter red mud slurry through a Whatman #40 filtering paper (15 cm) or piece of cloth of equivalent pore size for larger quantity to obtain a cake of 1 inch thick maximum. Filtration under vacuum is required but the cake must always be kept wet to avoid cracking. This is mainly important during cake washings.
3. Washing: Wash the cake three or four times with 10% v/v NH_4OH and wash it several times with hot distilled water until the washing water is neutral with phenolphtalein indicator. Wash it one or two times with acetone or ethanol to remove water.
4. Drying: Remove the cake and dry overnight at 105°C.
5. Grinding: Grind each sample at -150 mesh.
6. Screening: Screen each sample to -150 M and regrind oversize to 98% -150 M.
7. Drying: Ground sample, at 105°C for a minimum of 16 hours.
8. Blending: Blend each sample for 16 hours.
9. Bottling: Portion of 100 g in 125 mL plastic bottle.
10. Labeling: Affix a label on each bottle.
11. Shipping: Pack in labeled boxes (90 bottles/box).

Received 30 Mar 1987 CWS.

Alcan International Limited
Arvida Research and Development Centre

1955 Mellon Blvd, P.O. Box 1250, Jonquière (Québec) Canada G7S 4K8
418/548-1121 Telex: 05-25236

20 March 1987

Dr. Clinton W. Smith
Canada Centre for Mineral
and Energy Technology
555 Booth Street
Ottawa, Ontario
K1A 0G1

Dear Dr. Smith:

Re: Preparation of Alcan Non-Metallic Standards
(Corrections to my Letter dated 20 February 1987)

TROMBETAS bauxite should be identified as SARAMENHA bauxite (BXT-07) and is in fact shipped within a wooden box in a single brownish bag, and not in transparent plastic bags, as previously stated.

MURI MURI bauxite (BXT-08), from India, will be received at CANMET in a single wooden box containing several bags.

You will also receive an extra 5 gallons (white drum) of U.H.1 Red Mud (RM-04), simply another portion of the red mud standard sample you have already received.

Sincerely yours,

Monique Authier-Martin

MAM:PT

APPENDIX III

PREPARATIVE LOG OF J. POLLARD

ALCAN

APR 2

INVENTORY

- BXT-07, BXT-08, RM01, RM-02, RM-03, RM-04, RM-05.
- 436 8, 125ml BOTTLES.

APR 3

- BXT-07 — GROSS WEIGHT ~150 lbs
  - NET WEIGHT ~120 lbs
  - DRY NET WEIGHT ~112 lbs (AFTER 16hrs ON 120°C DRYING TRAYS.)
  - NET WEIGHT AFTER GRINDING - 105 lbs (MATERIAL WAS JAW-CRUSHED, AND ROLLED TWICE USING DENUER ROLLER.

TUE ½ DAY

WED JUN 17

- BXT-08 - GROSS WEIGHT ~ 190lbs
  - NET WEIGHT ~ 159 lbs
  - DRY NET WEIGHT ~ 158 lbs. (16 hrs ON 120°C DRYING TRAYS)
  - AFTER ROLLING ~ 154 lbs. (MATERIAL WAS JAW-CRUSHED, AND ROLLED TWICE, USING DENUER ROLLER)

THU JUN 18

- RAN 2 BALL MILLS OF BXT-07 AT 52.5 lbs EACH. (15 min)
- WET SCREEN OF 50 grams. YIELDED 81.2 % -150 m.

FRI JUN 19

- BEGAN SIEVING BXT-07 AT 150 m.
- RECOVERED 82.0 lbs OF -150 m
- +150 PORTION IS 19 lbs

MON JUN 22

- REGRIND OF +150m FOR 20 min HAS A -150 PERCENTAGE OF 89%
- WT OF -150 ~ 99 lbs.
- WT OF +150 ~ 2.0 lbs.
- WET SCREEN OF FINAL -150 MESH WAS ~100 %*

  * 50gr SAMPLE YIELDED A FEW +150 GRANULES.
- PUT BXT-07 ON DRYING TRAYS FOR 16 hrs AT 120°C

TUE JUN 23

- PUT ~ 74 lbs OF BXT-08 INTO BALL MILL FOR 20 min. WET SCREEN YIELDED ONLY 57.8% OF -150 m. (WILL RUN EXTRA 10 min)
- BLENDED BXT-07 FOR 16 hrs.

WED JUN 24

- BOTTLED AND PACKED 417 100 gr SAMPLES OF BXT-07
- TOOK 8 SUB-SAMPLES AT ~~00~~ INTERVALS OF 50.
- WET SCREEN OF BLENDED BXT-07 WAS 100% -150 m.

THUR JUN 25

- RAN BALL MILL (BXT 08) FOR 10 EXTRA MINUTES. (30 min TOTAL) WET SCREEN OF 69% -150m.
- BEGAN SIEVING BXT-08.
- CLEANED EQUIPMENT.

FRI JUN 26

- PUT ~ 40 lbs OF BXT-08 INTO BALL MILL FOR 30 min.
- WET SCREEN YIELDED 80.2% -150 m.
- PUT ~ 40 lbs OF BXT-08 INTO BALL MILL FOR 35 min

MON JUN 29

- RECOVERED ~~9~~ lbs OF BXT-08 -150m
- RECOVERED ~ 51 lbs OF BXT08 +150 m
- PUT ~ 51 lbs OF +150 BXT-08 INTO BALL MILL (25 min)
- ~~RE~~GRIND ~~WET~~ WET SCREENED AT ONLY 64.0%

TUE JUN 30

- 26 lbs OF +150 REMAINING AFTER SIEVING
- REGRINDED AGAIN IN BALL MILL FOR 25 min. WET SCREEN 77% -150
- RECOVERED 38.5 lbs OF -150 FOR A TOTAL OF 135.5 lbs, 120 lbs OF +150 (92%) IS LEFT OVER. (PULVERIZE ON THURSDAY)

~~WED~~ THUR

- PUT BXT-08 ON DRYING TRAYS FOR 18 hrs AT 120°C. WT (135.5 lbs)
- WET SCREEN OF DRY -150 YIELDED 100% OF -150 MESH. (50 gr SAMPLE.) (A FEW GRANULES OF +150)

THU JUL 2

- BLENDED BXT-08 FOR 16hrs.
- CLEANED ALL EQUIPMENT

FRI JUL 3

- BOTTLED AND PACKED 574, 100 gr. SAMPLES OF BXT-08 IN 125ml btls.

THU JUL 2

- BLENDED BXT-08 FOR 16hrs.
- CLEANED ALL EQUIPMENT

FRI JUL 3

- BOTTLED AND PACKED 574, 100 gr. SAMPLES OF BXT-08 IN 125ml btls.

CALCINED COKE - PCC-01

TUE JUL 28

- NET WEIGHT ~163 Kg.
- RAN PCC-01 THROUGH A 4m SCREEN STACKED ON A 14m SCREEN.
  - RECOVERED ~ 48.6 Kg OF THE -4 to +14 MESH FRACTION
- RAN ALL +4 MATERIAL THROUGH STACKED SCREENS AND RECOVERED 2.75 Kg OF -4 to +14 (51.3 Kg TOTAL)
- RAN ALL -4 to 14 MESH OVER 14 MESH SCREEN, AND OBTAINED A FINAL TOTAL OF ~ 47.2 Kg. Note: (-14 FRACTION 68.1 Kg AND +4 FRACTION ~ 49 Kg.
- THE 47.2 Kg OF -4 to -14 REPRESENTS ONLY 28.9% OF THE TOTAL SAMPLE, NOT 40% to 50% AS ORIGINALLY ESTIMATED.

WED JUL 29

- BLENDED PCC-01 FOR THE MINIMUM REQUIRED TIME OF 1 hr. TO AVOID FINES. (MATERIAL WAS QUITE BRITTLE).
- BOTTLING WAS DONE DIRECTLY FROM THE BLENDER INTO 1 L BOTTLES IN PORTIONS OF 800g.
- A TOTAL OF 56 bottles.

RM-01 - RM-05

- RECEIVED RM-04, RM-05, NOVEMBER 23RD.

MON NOV 23

- NET WT. OF RM-04 WET, ~71 lbs.
RM05 - " " " RM-05 " ~60 lbs
- PLACED RM-04 ON DRYING TRAYS AT 105°C

TUE NOV 24

- REMOVED RM-04 FROM DRYING TRAYS (15 hrs TOTAL)

WED NOV 25

PLACED RM-05 ON DRYING TRAYS AT 105°C
- NET WT. OF RM04 DRY IS, ~47.5 lbs.
- REMOVED RM-05 FROM DRYING TRAYS OVERNIGHT.

THU NOV 26

- REPLACED RM-05 AND REMOVED LATER, FOR A DRYING TIME OF 15 hrs IN TOTAL.
- DRY NET WT OF RM-05 IS ~38.5 lbs

FRI NOV 27

-HAND ROLLED RM-04, AND RM05

FRI DEC 4

- RAN RM-05 IN GRINDING MILL FOR 10 min (95.2% -150m., WET SCREEN)
- BEGAN SIEVING RM-05 THROUG A 150 MESH SCREEN.

MON DEC 7

- RECOVERED ~37 lbs OF -150 MESH RM-05, AND ~1½ lbs OF +150 m
- REMILLED +150 FOR A FINAL TOTAL OF ~38 lbs OF -150 MESH, AND ⅓ lb OF +150 FOR A TOTAL OF ~99% -150 MESH

TUE DEC 8

(1) → - PUT RM-05 ON DRYING TRAYS.
after sieving - ~~RAN~~ RAN RM-04 IN GRINDING MILL FOR ~12 min.
- 25g WET SCREEN OF RM-04 ~~END~~ AT 150 MESH SHOWED 94.8% AT -150m

WED DEC 9

- ~47 lbs RECOVERED FROM GRINDING MILL (RM-04)
- BEGAN SIEVING RM-04
- RECOVERED 1½ lbs OF +150 m, PUT IN MILL FOR REGRINDING
- RECOVERED ~46.5 lbs OF -150m AND ~.5 lb OF +150 (~99% -150)

THU DEC 10

- BLENDED RM05 FOR 16 hrs (OVERNIGHT)

FRI DEC 11

- BOTTLED AND LABELED 165, 100g SAMPLES IN 125 ml PLASTIC BOTTLES. (RM-05
- BLENDED RM-04 FOR 16 hrs.

TUE DEC 15

- BOTTLED AND LABELED 199, 100g SAMPLES IN 125 mL PLASTIC BOTTLES. (RM-04)

WED DEC 16

- RECEIVED RM-01, RM-02, RM-03.
- NET WT. WET:

  RM-01 - 121.5 lbs
  RM-02 - 183 5 lbs
  RM-03 - 79 lbs

- PLACED RM-02 ON DRYING TRAYS OVERNIGHT FOR ~17 hrs AT 105°C.

THU DEC 17

- RM02 NET WT. AFTER DRYING 128 lbs.
- PUT ~ 30lbs OF RM-02 INTO BALL MILL FOR 10 MIN (87% -150)
- PLACED RM-01 ON DRYING TRAYS OVERNIGHT FOR ~ 24hrs. (FINAL DRY WT. WAS

FRI DEC 18

- PUT ANOTHER 30lbs OF RM-02 INTO GRINDING MILL (10 min)
- " " " " " " " "
- BEGAN SIEVING RM-02 THROUGH A 150 MESH SCREEN.

MON DEC 21

- CONTINUED SIEVING RM-02

TUE DEC 22

- RECOVERED ~ 54 lbs RM-02 -150 MESH

WED & THU DEC 23 24

- CONTINUED SIEVING

TUE DEC 29

- FINAL WT OF -150 MESH OF RM-02 IS ~ 114 lbs (95% -150)
- " " " +150 " " " " ~ 6 lbs

WED DEC

- PUT RM-02 ON DRYING TRAYS, MILLED 30 lbs OF RM-01, 10 min (87%)
- LABELLED AND CAPPED 480, 100g SAMPLES IN 125 mL BOTTLES. (RM-02)

reduced the screen

THU DEC 31

CLEAN-UP.

MON JAN 4

- BEGAN SIEVING RM-01
- PUT RM-03 ON DRYING TRAYS.
- RECOVERED ~56.5 lbs OF RM-01 -150m ~ 95% -150m
  " ~3 lbs OF RM-01 +150 m.
- BLENDED RM-01 OVERNIGHT 16 hrs.

TUE JAN 5

- LABELED AND CAPPED ~30,000g SAMPLES OF RM-01

WED JAN 6

Sieved? ↓

- MILLED RM-03
- DRIED RM-03 FOR 16 hrs.

THU JAN 7

- BLENDED RM-03 OVERNIGHT FOR ~ 16 hrs.

FRI JAN 8

- LABELED AND CAPPED RM-03 ~100g SAMPLES IN 125mL BOTTLES.